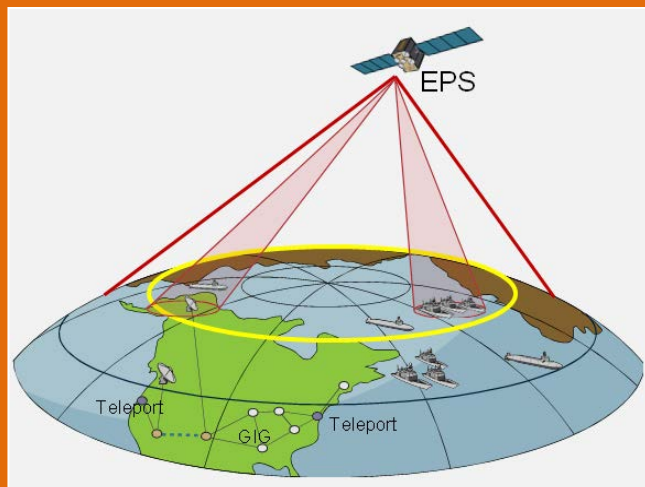




FY 2014 Annual Report on Cost Assessment Activities



February 2015

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FY 2014 Annual Report on Cost Assessment Activities



**Director, Cost Assessment and
Program Evaluation**

February 2015

**The estimated cost of this report for the Department of
Defense is approximately \$67,500 in Fiscal Years 2014-2015.
This includes \$62,500 in expenses and \$5,000 in DoD labor.**

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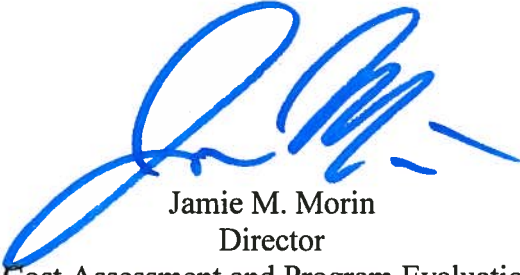
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FOREWORD

Our mission is to provide the Department with timely, insightful, and unbiased analysis on exceptionally difficult resource allocation and cost estimation problems to deliver the optimum portfolio of military capabilities through efficient and effective use of each taxpayer dollar. We serve as independent advisors to the Secretary and Deputy Secretary on programmatic and resource allocation issues and decisions.

We are also responsible for ensuring the Department's cost estimation and cost analysis processes provide accurate information and realistic estimates of cost for the major acquisition programs. Independent, rigorous, unbiased cost and schedule estimates, paired with thorough risk assessments, are essential for effective acquisition decision making and oversight. Achieving the goal of reducing cost and schedule growth in the Department's portfolio of acquisition programs requires that good cost estimates be available and considered throughout the acquisition process.

Toward that end, we continue to build a cost assessment organization that meets both the intent of the Weapon Systems Acquisition Reform Act of 2009 (WSARA) and the needs of the Department. Efforts continue to make the cost assessment process throughout the Department more effective, efficient, and timely. Our commitment to continually improve our processes requires attention to organizational structure and staffing, relevant training and education for the cost assessment community, and investments in improved analytic methods, tools, and data. Our progress in all of these areas is described in this report.



Jamie M. Morin
Director
Cost Assessment and Program Evaluation

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CHAPTER I – INTRODUCTION

The Director of Cost Assessment and Program Evaluation (CAPE), assisted by the Deputy Director for Cost Assessment and the entire CAPE team, is responsible for providing unbiased, independent cost estimates for major acquisition programs; ensuring that program cost and schedule estimates are properly prepared and considered in the Department's deliberations on major acquisition programs; and providing guidance and oversight for Analyses of Alternatives (AoAs) to ensure that the Department considers the full range of program and non-materiel solutions. Additionally, CAPE is responsible for leading the development of improved analytical skills and competencies within the cost assessment and program evaluation workforce of the Department. Finally, the Director of CAPE manages the annual Program Review process and serves as a key advisor to the Secretary and Deputy Secretary of Defense for the programmatic development of the Department's Future Years Defense Program (FYDP).

This report is concerned with cost estimation and cost analysis for major acquisition programs (i.e., Major Defense Acquisition Programs (MDAPs) and Major Automated Information System (MAIS) programs).

Section 2334 of title 10, United States Code—*Independent Cost Estimation and Cost Analysis*—requires that CAPE submit an annual report to the Congress that includes:

- (A) an assessment of the extent to which each of the military departments and Defense Agencies have complied with policies, procedures, and guidance issued by the Director with regard to the preparation of cost estimates for major defense acquisition programs and major automated information systems;
- (B) an assessment of the overall quality of cost estimates prepared by each of the military departments and Defense Agencies for major defense acquisition programs and major automated information system programs;
- (C) an assessment of any consistent differences in methodology or approach among the cost estimates prepared by the military departments, the Defense Agencies, and the Director; and
- (D) a summary of the annual review of the cost and associated information included in the program Selected Acquisition Reports (SARs), an identification of any trends in that information, an aggregation of the cumulative risk of the portfolio of systems reviewed, and recommendations for improving cost estimates on the basis of the review.

The organization of this report is as follows:

- Chapter II provides an overview of cost analysis in the Department of Defense (DoD). It describes the range of cost analysis organizations throughout the Department and explains the process for preparing cost estimates that support the defense acquisition process. It also identifies the main DoD systems that collect actual information on the contract and government costs of programs.
- Chapter III reviews the Department's Fiscal Year (FY) 2014 cost estimation and cost analysis activities associated with MDAPs and MAIS programs. These activities include independent cost estimates (ICEs) as well as CAPE reviews of military department and Defense Agency cost estimates, which inform the DoD decision authorities at milestone reviews and at other acquisition decision points. This chapter also summarizes the degree to which DoD cost estimation and assessment activities in FY 2014 complied with established procedures, and discusses overall quality and any consistent differences in methodology among the cost estimates. Some of the notable highlights in this chapter are:
 - **MDAP Milestone Reviews.** There were 12 MDAP milestone reviews or other review events supported by cost assessment activities.
 - **Critical Unit Cost Breaches.** There were two critical unit cost (Nunn-McCurdy) breaches supported by cost assessment activities.
 - **MAIS Critical Change.** There was one MAIS critical change certification supported by a cost assessment activity.
 - **Assessment of Compliance, Quality, and Differences in Methodology.** The cost assessment activities complied with the requirements of WSARA and the established procedures described in Chapter II. The overall quality of the cost estimates prepared by the military departments has continued to improve due to increased rigor and better data. A recent CAPE analysis made a comparison between the CAPE ICEs and the service cost positions, and found that the difference between the two estimates since the enactment of WSARA in 2009 has narrowed significantly relative to the period between 1999 and the enactment of WSARA. The median difference since enactment of WSARA was 2.6 percent, compared to a median difference of 6.6 percent for the prior period.
- Chapter IV describes the status of several ongoing initiatives that will ensure the cost assessment and cost estimating functions for the Department will be modernized as required to meet the expanded roles and responsibilities established by WSARA and the needs of the Department. These initiatives address a wide range of issues and concerns, including organizations and human resources, cost estimating policies and procedures, cost tools and data systems,

and education and training opportunities for the DoD cost community. Some of the notable highlights in this chapter are:

- **Cost Leadership Forum.** CAPE has established a periodic meeting with the leaders and senior staff of the military department cost agencies to discuss issues of common interest to the community. The intent is to establish greater collaboration among CAPE and the military department cost organizations by sharing analytic best practices and developing a collective vision of the path forward for the cost community over the next five years in meeting WSARA objectives, improving cost analysis, and dealing with the challenges of the current constrained resource environment.
- **Organizations and Human Resources.** CAPE and the military department cost agencies will be undertaking a review of the organizational structure and staffing needs of the cost community. Given the significant statutory responsibilities under WSARA and the constraints placed on the staffing of the cost workforce, CAPE will need to be both an active manager of organizational resources and a strong advocate for the entire cost community. However, all headquarters functions across the Department are under pressure to reduce staffing and resources, and CAPE and the military department cost agencies will not be exempt from this pressure. This pressure will intensify if the Department is driven to a sequester level of resources.
- **Policies and Procedures.** CAPE completed a final draft of a new issuance that will replace DoD Manual 5000.04-M, *Cost Analysis Guidance and Procedures*, and placed the issuance into the formal coordination process. The formal comment period closed in October 2014, and the issuance will be available shortly. This issuance will be the primary vehicle for implementing the cost assessment provisions of WSARA throughout DoD components. This issuance is consistent with the newly issued DoD Instruction 5000.02, *Operation of the Defense Acquisition System*.
- **Cost Data Collection.** Based on feedback from government users about desired report enhancements, as well as advancements in information systems technology, CAPE and the Cost Leadership Forum have commissioned several government management teams and working groups to modernize business processes and improve data collection and reporting from contractor and government organizations. These efforts will improve data quality, reporting compliance and timeliness, and also reduce reporting burden.
- **Cost Assessment Data Enterprise.** CAPE initiated the development of the Cost Assessment Data Enterprise (CADE)—the Department’s unified initiative to collect, organize, and use data more efficiently. CAPE is

partnering with the military department cost agencies and the Under Secretary of Defense for Acquisition, Technology, and Logistics (USD(AT&L)) staff to incrementally work towards its CADE vision of the government cost analyst's centralized database and virtual library, housing seamless integrated authoritative data sources that are easily searchable and retrievable. The goal is to reduce time spent on *ad hoc* data collection and validation, allowing more time for actual analysis at a much deeper level, and providing a quicker ability to see how a program is performing between major reviews. This initiative will increase analyst efficiency and will provide a way for analysts to build upon each other's work, where historically analysts have typically engaged in separate efforts.

- **Cost Analysis Education and Training.** CAPE and the military department cost agencies formed an Education and Training Working Group that periodically reports its status to the Cost Leadership Forum. The Working Group found that there was no centralized cost community education and training standard. As a first step to remedy this situation, the Working Group developed a framework of desired core competencies—for apprentice, mid-level, and senior cost analysts—that will be used to guide education and training standards in the future. In addition, CAPE now co-chairs the oversight group responsible for approval of the curriculum associated with Defense Acquisition University (DAU) and other courses leading to professional certification in Acquisition Cost Estimating.
- **Operating and Support Costs.** CAPE established a new Operating and Support (O&S) Cost Analysis Division in the summer of 2012. The division is responsible for a wide range of O&S cost estimates and analyses, and for assessing the adequacy of current systems, methods, and data used for preparing estimates of O&S costs. The division also partners with the USD(AT&L) staff to make O&S costs more visible in the acquisition decision process, with increased emphasis on O&S cost affordability and management.

The report also includes appendices that provide background information relevant to cost assessment activities. Appendix A enumerates the cost analysis organizations in the Department. Appendix B describes MDAP unit cost reporting and unit cost breach thresholds. Appendix C describes MAIS reporting and criteria associated with program deviations that trigger notifications or certifications to the Congress. Appendix D provides additional information on DoD cost data collection systems.

CHAPTER II – OVERVIEW OF COST ANALYSIS IN DoD

This chapter provides an overview of the current organizations, policies, procedures, and supporting data systems for cost estimation in place throughout DoD. Chapter IV of this report describes the efforts to continue to strengthen these institutions to meet the requirements of WSARA and the evolving needs of the Department.

This report assumes a modest familiarity with the defense acquisition process on the part of the reader. Readers in need of an introduction to the defense acquisition process are encouraged to refer to the *Defense Acquisition Guidebook* (<https://dag.dau.mil>).

Overview of Cost Analysis Organizations in DoD

There are cost organizations throughout DoD—in the Office of the Secretary of Defense (OSD), at the headquarters of the DoD Components (military departments and Defense Agencies), and in the Components' field organizations. DoD has a wide range of cost organizations, with each group having a unique but complementary role in support of the defense acquisition process and the broad and diverse operations of the Department.

At the OSD level, the Director, CAPE is responsible for providing ICEs for both MDAPs and MAIS programs when the Milestone Decision Authority (MDA) for a program is the USD(AT&L), under the specific circumstances explained later in this chapter. The Director, CAPE also provides policy for and oversight of preparation and review of DoD Component cost estimates for MDAPs and MAIS programs under other circumstances.

Each military department headquarters has its own cost agency. These cost estimating agencies provide ICEs when acquisition oversight is delegated to the Component and the MDA is the Component Head or Component Acquisition Executive. Also, the military department cost agencies provide policy guidance and provide specialized cost analyses unique to each of the military departments. The military department cost agencies reside in the financial management organizations of their military departments, and are outside their military department's acquisition chain of command.

There are also many field-level cost organizations. These organizations provide resources to support higher headquarters cost estimates and analyses, and they also provide assistance to support day-to-day operations of program offices and similar entities. Examples of such activities include evaluation of contractor proposals and should-cost analyses; support to competitive source selections; cost estimates in support of the programming and budgeting processes; and cost estimates used in specific analytic studies, such as systems engineering design trades or AoAs. Field-level and program office members of the cost community workforce often possess important specialized

cost and technical experience unique to specific system types or commodity groups—such as satellites, submarines, or tactical missiles.

Appendix A provides a brief description of the military department cost agencies and field-level cost organizations.

Procedures for Cost Assessments at Milestone Reviews and Other Events

This section provides a description of DoD cost assessment procedures for MDAPs and MAIS programs; many of these procedures were updated or added after enactment of WSARA.

Cost Assessment Procedures for Major Defense Acquisition Programs

Public law (section 2334 of title 10, United States Code) requires that an independent estimate of the life-cycle cost for an MDAP be prepared and presented to the MDA before the approval to proceed with Milestone A or B, or any decision to enter low-rate initial production or full-rate production.¹ At these milestone or other reviews, when the MDA is USD(AT&L), the ICE is prepared by the Director, CAPE. When the MDA is delegated to the DoD Component, the ICE supporting a milestone decision is provided by the applicable military department cost agency or the defense agency equivalent, and subsequently reviewed by CAPE. In either case, an ICE for a program in practice is conducted by using a combination of historical precedence, results of extensive site visits, and the actual performance of that program to date. It is a careful and comprehensive analysis that looks at all aspects of a program, including risks.

The framework for DoD policy and procedures for such ICEs and associated cost assessment activities is prescribed in DoD Instruction 5000.02, *Operation of the Defense Acquisition System*. Additional guidance on the implementation of the prescribed policy and procedures is provided in DoD Manual 5000.04-M, *DoD Cost Analysis Guidance and Procedures*. The status of recent updates to these regulations is provided in Chapter IV.

WSARA also revised the procedures for the certification of an MDAP that experienced sufficient cost growth to trigger a critical unit cost breach² (as defined in section 2433 of title 10, United States Code). Upon such a breach, USD(AT&L) can certify that the program meets certain criteria (set forth in section 2433a of title 10, United States Code), in which case the program can continue, or it may be terminated. One element of the

¹ Section 2334 also requires an ICE in advance of a certification of an MDAP in a critical unit cost breach status (see Appendix B); in advance of a certification of a MAIS program in a critical change status (see Appendix C); and at any other time considered appropriate by the Director, CAPE or upon the request of USD(AT&L/).

² A unit cost breach is commonly referred to as a Nunn-McCurdy breach.

required certification is the reasonableness of the new estimates of program unit costs. The determination that new program unit costs are reasonable is made by the Director, CAPE, and certified by USD(AT&L). As part of a standard business practice, CAPE prepares its own ICE that is used as a benchmark to support the assessment of reasonableness of the new unit cost estimates. Appendix B provides a description of the procedures for unit cost reporting and the criteria for a critical unit cost breach.

Cost Assessment Procedures for Major Automated Information Systems

Section 2334 of title 10, United States Code specifies that CAPE is responsible for preparing an ICE for any MAIS program that has experienced a Critical Change (as explained in Appendix C) if the MDA is USD(AT&L). CAPE may also prepare an ICE for a MAIS program at any other time considered appropriate by the Director, CAPE, or upon the request of USD(AT&L). In addition, for the MAIS programs for which acquisition oversight has been delegated to the Component, CAPE is responsible for establishing policies for preparation and review of Component cost estimates at milestone reviews, and for revised program cost estimates in support of certification of a MAIS program that has experienced a Critical Change.

Currently, for the 35 MAIS programs, USD(AT&L) is the MDA for 20 programs; the DoD Chief Information Officer is the MDA for two programs; and the various Component Acquisition Executives are the MDAs for the remaining 13 programs.

Role of the Independent Cost Estimate

Both MDAPs and MAIS programs are supported by ICEs at milestone and other program reviews. At a minimal level, the purpose of the ICE is to allow decision makers to ensure that (1) current program cost estimates are reasonable, (2) initial program baselines established for cost and schedule are realistic and achievable, (3) subsequent program baselines remain realistic, and (4) sufficient funding is available in the FYDP to execute the program. However, CAPE experience is that the ICE should also support much broader program decisions. The ICE can provide decision makers with insights concerning:

- Unique challenges of each program, and options available to address them;
- Trade-offs to balance cost with capabilities and schedule;
- Alternative acquisition strategies to improve upon ways to do business, and avoid risk-prone models; and
- Options to effect better program outcomes along the way, as circumstances change or unexpected events occur.

In short, the ICE adds value by being able to tell the program's story and provide decision makers with a wide range of information necessary to make fully informed acquisition decisions.

Component Cost Position and Full Funding Commitment

One important element of current DoD policy for major acquisition programs requires the Component to establish a formal position on the estimated cost of the program, and furthermore, to commit to fully fund the program in the FYDP consistent with the Component's cost position. The Component and the military department cost agency (or defense agency equivalent) establish a documented Component Cost Position for all MDAPs and MAIS programs prior to the Milestone A, B, and C reviews and the Full-Rate Production Decision (for an MDAP) or Full Deployment Decision Review (for a MAIS program). The Component Cost Position is signed by the appropriate military department's Deputy Assistant Secretary for Cost and Economics (or defense agency equivalent). Each Component has its own process to arrive at the Component Cost Position. In many cases, the Component establishes its cost position by performing a Component-wide corporate-level review, led by the military department cost agency (or defense agency equivalent), after consideration of a program office cost estimate and an assessment of that estimate by the military department cost agency.

At each milestone or other review, the Component must fully fund the program to the Component Cost Position in the current FYDP, or commit to full funding of the cost position in the next FYDP. The Component Acquisition Executive and the Component Chief Financial Officer endorse and certify in a Full Funding Certification Memorandum that the FYDP fully funds (or will fully fund) the program consistent with the Component Cost Position. This Certification Memorandum must be submitted prior to the Defense Acquisition Board (DAB) review.

Multi-Year Procurement

Public law (section 2306b of title 10, United States Code) establishes several criteria that must be satisfied and certified by the Secretary of Defense prior to the award of a multi-year contract for a defense acquisition program. Some of these criteria (concerning substantial savings, realistic cost estimates, and availability of funding) must be supported by a CAPE cost analysis of the proposed multi-year procurement (MYP) strategy and contract structure, which includes a comparison of the estimated costs of multi-year versus annual contract awards. The analysis is based on actual cost data and experience to date, as well as an evaluation of cost realism in the contractor's proposals.

Section 816 of the *National Defense Authorization Act for Fiscal Year 2015*, Public Law 113-291, amended section 2306b to restate and revise the legal requirements, including

the role of CAPE, applicable to MYP contracts. CAPE is working with other DoD staff elements to determine how section 816 will be implemented.

Confidence Levels in Cost Estimates

WSARA, as amended by section 811 of the *National Defense Authorization Act for Fiscal Year 2011*, Public Law 111-383 (section 2334 of title 10, United States Code), requires that cost estimates adopt a confidence level that provides a high degree of confidence that the program can be completed without the need for significant adjustment to program budgets. In general, CAPE satisfies this requirement by ensuring that all of its cost estimates are built on a product-oriented Work Breakdown Structure (WBS), based on historical actual cost information whenever possible, and most importantly, based on conservative assumptions that are consistent with actual demonstrated contractor and government performance for a series of acquisition programs in which the Department has been successful.

Cost Estimates for Contract Negotiations

Section 2334 of title 10, United States Code requires that for MDAPs and MAIS programs, cost estimates developed for baselines and other program purposes are not to be used for the purpose of contract negotiations or obligation of funds. Section 2334 also states that cost analyses and targets developed for the purpose of contract negotiations shall be based on the government's reasonable expectation of successful contractor performance in accordance with the contractor's proposal and previous experience.

The procedures to implement these statutory requirements were developed as part of the Department's "Should Cost" initiative, which is intended to proactively target cost reduction and drive productivity improvement into major acquisition programs. These procedures are contained in DoD Instruction 5000.02, *Operation of the Defense Acquisition System*. In this instruction, for MDAPs and MAIS programs, it is DoD policy to budget to the CAPE ICE unless an alternative estimate is specifically approved by the MDA. However, program managers are required to develop a "should cost" estimate as a management tool to control and reduce cost. The intention is that the ICE should not be allowed to become a self-fulfilling prophecy. The "Should Cost" initiative challenges managers to identify and achieve savings below budgeted most-likely costs. "Should Cost" analyses can be used during contract negotiations (particularly for sole source procurements) and throughout program execution, including sustainment. Further information on the "Should Cost" initiative is provided in the *Defense Acquisition Guidebook*, section 10.15.2 ("Should-Cost").

Cost Analysis Requirements Description

CAPE requires and provides guidance on the technical content and use of a document known as the Cost Analysis Requirements Description (CARD). The CARD provides information on the acquisition program that supports preparation of both the Component Cost Position and the CAPE ICE. The CARD describes the key technical, programmatic, and operational characteristics of an acquisition program. The foundation of a sound and credible cost estimate is a well-defined program, and the CARD is used to provide that foundation.

DoD Cost Data Collection Systems

Systematic and institutionalized cost data collection and validation is critical to the preparation and support of credible cost estimates. DoD has three primary collection systems for cost data for MDAPs. The Cost and Software Data Reporting (CSDR) system serves as the primary source of cost data for major contracts and subcontracts associated with MDAPs and MAIS programs. The Earned Value Management (EVM) Central Repository is used to collect and archive EVM reporting documents (such as Integrated Program Management Reports). The three Visibility and Management of Operating and Support Costs (VAMOSC) systems (one system for each military department) collect historical O&S costs for fielded major weapon systems.

Chapter IV discusses current CAPE efforts to improve the CSDR and VAMOSC systems, and Appendix D provides additional details concerning all of the cost data collection systems.

Summary

This chapter reviewed the cost assessment organizations, policies and procedures, and data collection systems in DoD. These provide the foundation on which the Department is building as it continues to implement WSARA and strengthen the cost assessment institutions. The initiatives that constitute this implementation and the vision of the changes that are being made are described in Chapter IV of this report.

CHAPTER III – DoD COST ASSESSMENT ACTIVITIES IN FY 2014

This chapter provides a summary of the DoD cost estimates and cost analyses that were made in FY 2014 in support of MDAP milestone reviews and other acquisition decision points, award of MYP contracts, certifications of MDAP critical unit cost breaches, and certifications following MAIS critical changes.

MDAP Milestone or Other Review Cost Assessment Activities

Table 1 provides a summary of the cost assessment activities in FY 2014 that supported milestone or other reviews. For each MDAP with a milestone review or other event, Table 1 identifies the program name and acronym, the responsible Component, the supporting cost estimate(s) or analyses presented to the MDA, and the review event being supported. There were 12 MDAP milestone reviews or other events supported by cost assessment activities in FY 2014 (excluding any cost assessment activities associated with classified programs, which are not discussed in this unclassified report).

Table 1. MDAP Milestone or Other Review Cost Assessment Activities in FY 2014

Program Name	Acronym	Component	Program Type	Cost Assessment Activity	Activity Date	Supported Event	Event Date
Paladin Integrated Management	PIM	Army	Acquisition Category (ACAT) ID	CAPE Independent Cost Estimate	21-Oct-13	Milestone C	21-Oct-13
				Army Cost Position	18-Oct-13		
Indirect Fire Protection Capability Increment 2–Intercept	IFPC Inc 2–I	Army	ACAT ID	CAPE Independent Cost Estimate	21-Oct-13	Milestone A	24-Mar-14
				Army Cost Position	20-Aug-13		
P-8A Poseidon Multi-Mission Maritime Aircraft	P-8A	Navy	ACAT ID	CAPE Independent Cost Estimate	12-Nov-13	Full-Rate Production Decision	3-Jan-14
				Navy Cost Position	31-Oct-13		
Ground/Air Task Oriented Radar	G/ATOR	USMC	ACAT IC	Navy Cost Position	1-Jan-14	Milestone C	10-Mar-14
				Navy Independent Cost Estimate	15-Dec-13		
Patriot Advanced Capability-3 Missile Segment Enhancement	PAC-3 MSE	Army	ACAT ID	CAPE Independent Cost Estimate	24-Jan-14	Milestone C	See below
				Army Cost Position	8-Jan-14		
Patriot Advanced Capability-3 Missile Segment Enhancement	PAC-3 MSE	Army	ACAT ID	CAPE Independent Cost Estimate	7-Mar-14	Milestone C update	27-Mar-14
				Army Cost Position	25-Feb-14		
Cooperative Engagement Capability	CEC	Navy	ACAT IC	CAPE Review and Assessment	21-Mar-14	Full-Rate Production Decision	14-Apr-14
				Navy Independent Cost Estimate	20-Mar-14		

Table 1. MDAP Milestone or Other Review Cost Assessment Activities in FY 2014 (cont.)

Program Name	Acronym	Component	Program Type	Cost Assessment Activity	Activity Date	Supported Event	Event Date
Enhanced Polar System	EPS	Air Force	ACAT ID	CAPE Independent Cost Estimate	31-Mar-14	Milestone B	30-Apr-14
				Air Force Cost Position	28-Jan-14		
Space Fence Ground-Based Radar System Increment 1	Space Fence Inc 1	Air Force	ACAT ID	CAPE Independent Cost Estimate	5-May-14	Milestone B	30-May-14
				Air Force Cost Position	30-Apr-14		
Excalibur Precision 155mm Projectiles	Excalibur	Army	ACAT IC	Army Cost Position	22-May-14	Full-Rate Production Decision	6-Jun-14
				Army Independent Cost Estimate	8-May-14		
Combat Rescue Helicopter	CRH	Air Force	ACAT ID	CAPE Independent Cost Estimate	17-Jun-14	Milestone B	18-Jun-14
				Air Force Cost Position	14-May-14		
Three-Dimensional Expeditionary Long-Range Radar	3DELRR	Air Force	ACAT ID	CAPE Independent Cost Estimate	26-Aug-14	Milestone B	30-Sep-14
				Air Force Cost Position	15-Aug-14		

Notes:

The term "ACAT ID" refers to an MDAP for which the MDA is USD(AT&L).

The term "ACAT IC" refers to an MDAP for which acquisition oversight has been delegated to the Component.

The term "pre-MDAP" refers to a program activity that is anticipated to result in an MDAP upon formal program initiation into the defense acquisition management process (which usually occurs at Milestone B).

Remarks about Specific Programs

- CAPE reviewed the Navy ICE prepared by the Naval Center for Cost Analysis (NCCA) for the Full-Rate Production Decision review of the Cooperative Engagement Capability program. CAPE found that the Navy ICE was developed using generally accepted cost analysis procedures suitable for an OSD milestone review.
- Both the CAPE ICE and the Army Cost Position for the Patriot Advanced Capability-3 Missile Segment Enhancement program were updated and provided to a second Milestone C DAB review. The milestone approval and associated contract award were delayed to allow for additional analysis. Updates to the cost estimates were made to account for revised programmatic content. In addition, analysis of assumed profit margins led to lower margins prior to contract award. Finally, there was considerable analysis to account for the effects of known and potential additional Foreign Military Sales (FMS), permitting a better understanding of the most likely costs for the United States.

CAPE Cost Analysis for Multi-Year Procurement

As noted in Chapter II, CAPE prepares an ICE for a proposed MYP strategy and contract structure to support the Department's certification of substantial savings and other criteria, prior to the award of a multi-year contract for a defense acquisition program. In FY 2014, the Department made no MYP certifications, and so no new ICEs were developed. However, in 2014 CAPE updated several prior ICEs for MYP strategies to incorporate the latest cost information (in some cases, following contract award). During 2014, updates of estimated MYP savings were made for the E-2D Advanced Hawkeye, the C-130J Super Hercules, the Virginia class submarine, and the DDG 51 destroyer. In addition, CAPE worked on an ICE to support a certification for the Standard Missile 3 (SM-3) expected next year. A description of the SM-3 ICE will be provided in next year's Annual Report.

MDAP Critical Unit Cost Breach Cost Assessment Activities

Table 2 provides a summary of the cost assessment activities supporting certification decisions associated with critical unit cost (Nunn-McCurdy) breaches in FY 2014. For each major acquisition program with a critical breach, Table 2 identifies the program name and acronym, the responsible Component, the supporting cost estimate(s) or analyses presented to the USD(AT&L), and the date of the critical breach certification. Descriptions of unit cost (Nunn-McCurdy) reporting and the certification process associated with unit cost breaches are provided in Appendix B.

Table 2. MDAP Critical Unit Cost Breach Cost Assessment Activities in FY 2014

Program Name	Acronym	Component	Program Type	Cost Assessment Activity	Activity Date	Supported Event	Event Date
MQ-8 Fire Scout Vertical Takeoff and Landing Unmanned Aerial Vehicle	VTUAV	Navy	ACAT ID	CAPE Independent Cost Estimate December 2013 SAR	9-Jun-14	Critical Unit Cost Breach Certification	16-Jun-14
Joint Precision Approach and Landing System Increment 1A	JPALS Inc 1A	Navy	ACAT ID	CAPE Independent Cost Estimate December 2013 SAR	13-Jun-14	Critical Unit Cost Breach Certification	15-Jun-14

Two critical breach certifications occurred in FY 2014. Both of them were supported by the appropriate cost estimates and analyses that complied with the requirements of WSARA and the established cost assessment procedures described in Chapter II. For the critical breach certifications, each event was supported by (1) a new estimate of program unit cost, as reflected in a revised SAR, and (2) the corresponding CAPE ICE for program unit cost.

MAIS Critical Change Cost Assessment Activities

Table 3 provides a summary of cost assessment activities in FY 2014 supporting certification decisions associated with MAIS critical changes. For each major acquisition program with a critical change, Table 3 identifies the program name and acronym, the responsible Component, the supporting cost estimate(s) or analyses presented to the USD(AT&L), and the date of the critical change certification provided to the Congress. Descriptions of MAIS reporting and the certification process associated with critical changes are provided in Appendix C.

Only one MAIS critical change certification occurred in FY 2014. It was supported by the appropriate cost estimates and analyses that complied with the requirements of WSARA and the established cost assessment procedures described in Chapter II. In particular, the critical change certification event was supported by a CAPE ICE and a Component Cost Position.

The critical change noted in Table 3 for the Consolidated Afloat Network Enterprise Services (CANES) program was due to the program exceeding the five-year limit on the time from the selection of the preferred alternative to the Full Deployment Decision.

Table 3. MAIS Critical Change Cost Assessment Activities in FY 2014

Program Name	Acronym	Component	Program Type	Cost Assessment Activity	Activity Date	Supported Event	Event Date
Consolidated Afloat Network Enterprise Services	CANES	Navy	ACAT IAM	CAPE Independent Cost Estimate	21-Feb-14	Critical Change Certification	10-Mar-14
				Navy Cost Position	5-Feb-14		

Assessment of Compliance, Quality, and Differences in Methodology

All of the events noted in Table 1 through Table 3 were supported by the appropriate cost estimates or analyses that complied with the requirements of WSARA and the established cost assessment procedures described in Chapter II. In particular, each MDAP and MAIS milestone or other review was supported by (1) a Component Cost Position and (2) the appropriate CAPE or military department cost agency ICE.

The overall quality of the cost estimates prepared by each of the military departments has continued to improve due to increased rigor. As noted in Chapter II, DoD has instituted a policy—currently in place for all MDAPs—requiring that a signed, dated Component Cost Estimate and a Component Cost Position be delivered to CAPE prior to delivery of an ICE, to support each milestone or other review of the DAB. Also, the military department’s financial and acquisition leadership must provide a statement affirming their commitment to fully fund the program to the Component Cost Position during the preparation of the next Program Objective Memorandum (POM) and President’s Budget FYDP.

The quality of the cost estimates for MDAPs provided by the military departments, as well as CAPE, has also continued to improve due to better data. This is largely attributable to improved availability of actual cost information for DoD programs as a result of the long-term initiative to collect contractor cost and software data reports, and the long-term efforts of each of the military departments to improve the collection of actual O&S cost information through the VAMOS systems. Moreover, in cases in which required cost data are not being reported in a timely fashion (i.e., are more than six months late), CAPE now insists that the data be provided before it can complete its ICE. Recent efforts to strengthen the timeliness of cost data reporting are described in Appendix D.

Since enactment of WSARA, there are no consistent differences in methodology or approach between the cost estimates prepared by the military departments and CAPE. Generally, the approach employed by the military departments is evolving to become more similar to that employed in CAPE: collect actual cost information from ongoing and historical programs in a product-oriented taxonomy; use that information to prepare cost and schedule forecasts for new programs or programs proceeding to the next milestone in the acquisition process; and review the actual cost information collected, as each individual program proceeds, to update and adjust the cost and schedule forecasts for the program to reflect actual experience. The goal has been for the Department to improve the systematic collection of actual cost information over time, resulting in smaller

differences between the cost and schedule forecasts of the military departments and CAPE.

A recent CAPE analysis made a comparison between the CAPE ICEs and the service cost positions, and found that the difference between the two estimates since the enactment of WSARA in 2009 has narrowed significantly relative to the period between 1999 and the enactment of WSARA. The median difference since enactment of WSARA was 2.6 percent, compared to a median difference of 6.6 percent for the prior period. In addition, the statistical variances have also significantly narrowed, meaning that the post-WSARA estimates are more tightly clustered thus reflecting that the service cost positions are now more closely aligning with the CAPE ICEs. Despite this narrowing of differences, there have been a few outliers where there was a significant discrepancy (greater than 10 percent) between the service cost position and the CAPE ICE. In such a situation, CAPE and the military department cost agency will meet and assess the reasons for the discrepancy, and determine if there are better data available to reconcile the difference. Failing that, CAPE and the military department will work together to assess how costs can be controlled in the future as the program goes forward.

SAR Improvement

The scope of this Annual Report will be expanded in accordance with section 812 of the *National Defense Authorization Act for Fiscal Year 2014*, Public Law 113-66, which calls for the inclusion of additional cost estimate and other associated information in program SARs. This new information will be phased in incrementally. This new reporting will begin for five pilot MDAPs with the December 2014 SAR reporting period, submitted with the FY 2015 President's Budget, and will apply to all MDAPs by the December 2019 reporting period.

This year, CAPE worked with the USD(AT&L) staff to define specific requirements for the new information that will be incorporated into the SARs in order to facilitate future cost analyses. Beginning next year, CAPE will be required to review program cost and associated information in SARs, as each MDAP is phased in. The CAPE Annual Report will contain (1) a summary of the cost and associated information reviewed, (2) an identification of any trends in that information, (3) an aggregation of the cumulative risk of the portfolio of systems reviewed, and (4) recommendations for improving cost estimates on the basis of the review.

Areas for Improvement

In a few cases, our cost estimates involved programs that had plans or the potential for FMS. FMS cases have significant possible benefits in lowering the costs of programs to the United States, since the procurement of additional systems will lead to unit cost reductions for all parties. In some cases, the foreign country may also contribute to the

recoupment of prior development costs. However, quantifying these benefits in cost estimates can often be challenging, due to the complexities of issues such as coproduction, tie-ins with United States MYP contracts, and forecasting the effects on contractor business bases and rates. Nevertheless, assessing the implications of FMS provides a better understanding of the complete costs for the United States. For example, for the PAC-3 MSE program discussed earlier, the potential for FMS had a significant effect on the costs for the United States. CAPE is now evaluating how to improve the cost community tools, methods, and policies for cases involving FMS.

For MAIS programs, due to resource constraints, direct CAPE involvement in preparing cost estimates has been limited to those programs for which the MDA is USD(AT&L) and that experience a critical change. For other reviews of MAIS programs, CAPE works closely with and relies heavily upon the military department cost agencies in the management and preparation of cost estimates. In addition, contract cost data reporting for the MAIS programs currently is poor, and both quality and compliance need to be improved. There remains much work to be done to improve the management and preparation of cost estimates for the approximately 35 programs now in the DoD portfolio of MAIS programs and automated information systems expected to become MAIS programs in the near future.

Other Cost Assessment Activities in FY 2014

Missile Defense Agency Support

CAPE received requests from the Missile Defense Agency (MDA) in 2014 to assess several MDA programs. As MDA operates largely outside of DoD 5000 regulations, CAPE's cost assessment role is typically limited to supporting the agency's production decisions as defined by the initial use of procurement funds. CAPE does not typically conduct cost assessments for MDA development efforts and systems acquired using Research, Development, Test and Evaluation funds. To support a production decision on the SM-3 Block IB initially planned for FY 2015, MDA requested that CAPE support the review by developing a cost estimate. CAPE initiated this analysis in FY 2014 and completed it in the first quarter of FY 2015.

In addition, MDA requested that CAPE perform cost analyses to determine if the use of a MYP strategy would result in substantial savings for an SM-3 Block IB missile contract and a Terminal High Altitude Area Defense (THAAD) interceptor contract. CAPE conducted these analyses during FYs 2014-2015 to support consideration for possible inclusion in the FY 2016 President's Budget request. Although THAAD is no longer being considered for a MYP, CAPE's analysis will be used as a basis for the FY 2015 production decision.

The Congress has also requested that CAPE update its cost estimate for the United States European Phased Adaptive Approach and assess that the Tests and Targets Efficiencies that have been implemented at MDA. These assessments were started in FY 2014 and will be completed in the second quarter of FY 2015.

CAPE also worked closely with MDA's Director of Cost Estimating and Analysis to improve the quality of CSDR data obtained from MDA contracts.

National Nuclear Security Administration Support

Section 3112 of the *National Defense Authorization Act for Fiscal Year 2014*, Public Law 113-66, directed that CAPE work with the National Nuclear Security Administration (NNSA) leadership to develop a plan for the establishment of a Cost Estimating and Program Evaluation (CEPE) group within NNSA. During FY 2014, CAPE and NNSA formulated a plan that addresses the full range of capabilities required to successfully execute this function, including CAPE's roles for guidance and training of NNSA CEPE personnel over the next five years. NNSA implementation of this plan has only just begun. Additionally, CAPE provided summaries of assessments it performed of the NNSA budgets and projects to the Congressional Advisory Panel on the Governance of the Nuclear Security Enterprise established by Section 3166 of the *National Defense Authorization Act for FY 2013*, Public Law 112-239.

Continued support of NNSA projects in future years is anticipated through requests from the Nuclear Weapons Council chaired by the USD(AT&L) and the development of the CEPE group. It is currently planned to have NNSA personnel embedded in the CAPE staff in preparation of future ICEs for NNSA activities.

DoD Cost Analysis Symposium

For several decades, CAPE (and its predecessor organization) has sponsored an annual DoD Cost Analysis Symposium, known as DoDCAS, with attendees drawn primarily from government and private-sector cost research and analysis organizations. DoDCAS provides a valuable forum for the education, training, and improvement of communication within the DoD cost analysis community. The presentations made at DoDCAS facilitate discussion, instruction, and debate concerning cost estimating methods and models, data collection, and contemporary issues of interest to the DoD cost community. In this way, the event leverages the knowledge and experience of the community to increase individual and collective expertise in cost estimation and analysis. DoDCAS also provides members of the DoD cost community the opportunity to hear the insights of senior DoD and other government officials on important topics.

The symposium event that had been planned for February 2013 was cancelled due to guidance from the Office of Management and Budget (OMB) and the Deputy Secretary

of Defense to reduce expenditures for all conferences and travel. Also, a major concern was that the potential DoD and other government agency attendees would not have travel funding available to attend the event. In 2014, CAPE was able to hold a limited one-day symposium at DAU that featured several high-level speakers who discussed topics of interest to the cost community. CAPE is now evaluating options for 2015 for a more robust three-day session, with presentations from speakers throughout the cost community, at a government training facility in a low-cost area in order to provide essential training while complying with continued restrictions on expenses for conferences and travel.

CHAPTER IV – THE LOOK FORWARD

WSARA introduced major reforms to the DoD cost estimation processes. Since its enactment, CAPE has made and continues to make significant progress in implementing these reforms. This chapter discusses the status and future plans for several key initiatives that collectively constitute this implementation.

Cost Leadership Forum

The CAPE Deputy Director for Cost Assessment has established a periodic meeting (known as the Cost Leadership Forum) held with the leaders and senior staff of the military department cost agencies to discuss issues of common interest to the community. The intent is to establish greater collaboration among CAPE and the military department cost organizations by sharing analytic best practices, and developing a collective vision of the path forward for the cost community over the next five years in meeting the WSARA objectives, improving cost analysis, and dealing with the challenges of the current constrained resource environment. This collaboration and collective vision is being pursued to lead to more efficient business processes, while maintaining the independence of CAPE and Service ICEs, and protecting the internal deliberations within each military department and its respective cost agency.

The Cost Leadership Forum meets quarterly. Some of the major topics discussed at the Forum include:

- Organizational status and human resources
- Cost assessment policies and procedures
- Cost data collection
- CADE project
- Training and education for the cost community
- Collective vision for the cost community

The current plans and ongoing initiatives for each of these topics are described in the remainder of this chapter. The Cost Leadership Forum will continue to meet quarterly and provide executive oversight for these and other initiatives.

In addition, the Cost Leadership Forum has established a subordinate body—the Cost Research Board—to provide corporate management of DoD cost research and studies. The goals of the Board are to eliminate any duplication in projects, combine research and studies across organizations to promote integration within the cost community, and align research and studies with senior management priorities.

Organizations and Human Resources

To meet the statutory requirements of WSARA and the other needs of the Department, CAPE is responsible for assessing the staffing needs of its own organization, as well as the overall cost community. This assessment must consider the size, qualifications, and expertise of the civilian and military workforce, as well as the effectiveness of the overall management and organizational structure.

Efforts toward making this assessment began in 2013 with activities to gather data on the workforce size, grade, and demographics, as well as experience and education levels. Beyond that, there is interest in measuring projected workload volume and content (i.e., what the cost community is actually doing), to help determine whether scarce resources are properly focused on strategic priorities. However, these efforts were suspended in 2014 due to the tremendous uncertainty in the projected DoD budget and manpower levels.

CAPE is now resuming these efforts, and with the military department cost agencies, will be undertaking a review of the organizational structure and resource needs of the cost community. Given the significant statutory responsibilities under WSARA and the constraints placed on the staffing of the cost workforce, CAPE will need to be both an active manager of organizational resources and a strong advocate for the entire cost community. However, all headquarters functions across the Department are under pressure to reduce staffing and resources, and CAPE and the military department cost agencies will not be exempt from this pressure.

Policies and Procedures

WSARA states that the Director, CAPE—in consultation with other officials of OSD, the military departments, and Defense Agencies—shall prescribe policies and procedures for the conduct of cost estimation and cost analysis for major acquisition programs of DoD.

The framework for DoD policy and procedures concerning cost assessment activities for defense acquisition programs is provided in DoD Instruction 5000.02, *Operation of the Defense Acquisition System* (see Enclosure 10: Cost Estimating and Reporting). This instruction was recently updated on January 7, 2015.

DoD Manual 5000.04-M, *Cost Analysis Guidance and Procedures*, provides more specific guidance to implement the framework provided in DoD Instruction 5000.02. CAPE completed a final draft of a new issuance that will replace this Manual and placed the issuance into the formal coordination process. The formal comment period closed in October 2014, and the issuance will be available shortly. This issuance is the primary vehicle for implementing the cost assessment provisions of WSARA throughout DoD

components. In particular, it provides guidance to the military departments and Defense Agencies concerning the preparation, presentation, and documentation of life-cycle cost estimates for major acquisition programs. It assigns roles and responsibilities, and describes the process and the timeline, for each of the following:

- Preparation of CAPE ICEs supporting a USD(AT&L) decision review,
- CAPE review of Component ICEs supporting a Component decision review,
- Preparation of CAPE cost analyses supporting a MYP contract award,
- CAPE cost analyses supporting a critical unit cost breach certification, and
- CAPE cost analyses supporting a MAIS critical change certification.

CAPE also completed the *O&S Cost-Estimating Guide* in March 2014. The guide is described later in this chapter.

In recent years, CAPE has also issued the following:

- DoD Directive 5105.84, *Director of Cost Assessment and Program Evaluation* (issued May 11, 2012)
- DoD Manual 5000.04-M-1, *Cost and Software Data Reporting (CSDR) Manual* (issued November 4, 2011)
- DoD Instruction 7041.04, *Estimating and Comparing the Full Costs of Civilian and Active Duty Military Manpower and Contract Support* (issued July 3, 2013)

These documents were described in previous editions of the Annual Report, and are available on the Defense Technical Information Center web site at <http://www.dtic.mil/whs/directives/>.

To support the DoD community in performing the numerous calculations required by DoD Instruction 7041.04, CAPE has made available a web-enabled tool for estimating the Full Cost of Manpower (FCoM), which will automatically calculate all cost elements required to maintain consistency with guidance in the instruction. The FCoM tool is available on the CAPE website (www.cape.osd.mil) and is usable by all personnel who possess a valid Common Access Card. A classified version of the tool is available on the DoD Secure Internet Protocol Router Network. The tool has already been used to compare the costs of military and civilian intelligence personnel, and in the future will be used to estimate manpower costs for the development and expansion of the cyber workforce.

In addition, CAPE has recently assumed responsibility for DoD Instruction 7041.3, *Economic Analysis for Decisionmaking*. This instruction prescribes the application of

economic analysis concepts to the evaluation of costs and benefits of investment alternatives. The instruction will be updated and reissued in the near future.

Cost Indices

WSARA—as codified in section 2344 of title 10, United States Code—requires that CAPE periodically assess and update the cost indices used by the Department to ensure that such indices have a sound basis and meet the Department’s needs for realistic cost estimation. The Under Secretary of Defense (Comptroller), or USD(C), provides the DoD military departments and Defense Agencies with guidance in the DoD Financial Management Regulation on how to prepare budget estimates that comply with guidelines issued by OMB; this guidance includes instructions on the use of USD(C)-provided deflators that are calculated from the OMB inflation forecast.

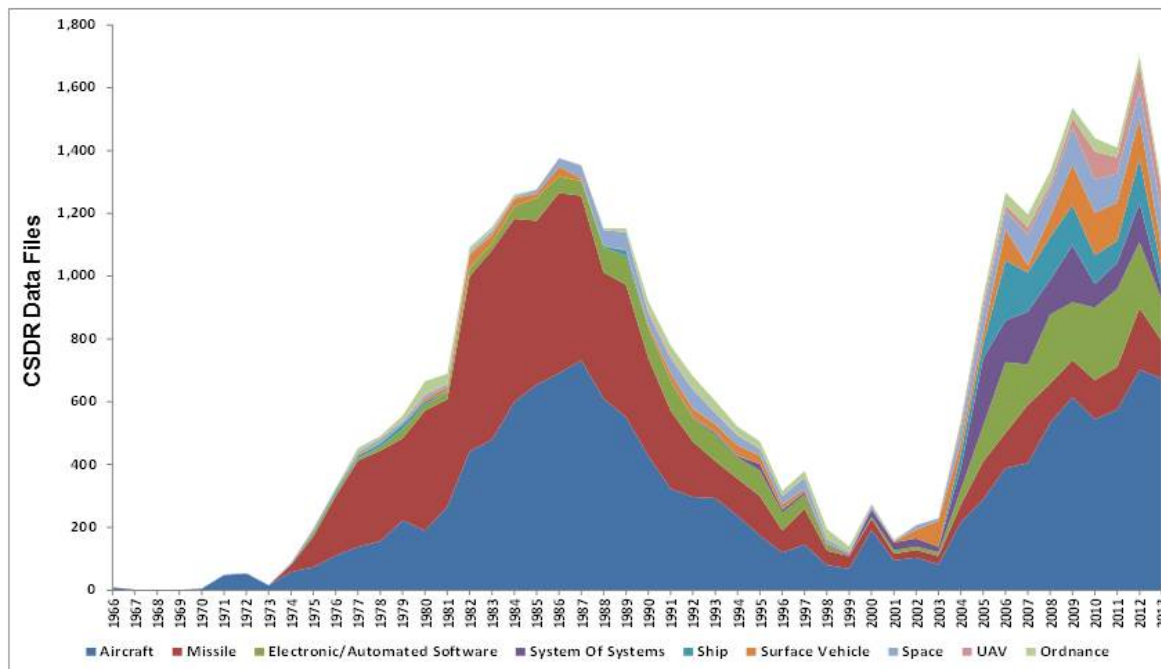
Some DoD organizations—most notably the Naval Sea Systems Command (NAVSEA), Naval Air Systems Command (NAVAIR), and many Air Force program offices—have developed product-specific price escalation indices for use in their program cost estimates. These price indices include market price influences beyond just general inflation adjustments accounted for by the USD(C)/OMB deflators.

Based on this experience, the current practice in the cost community is to encourage the use of product-specific price indices when there is significant evidence that the product-specific price indices reflect the most likely cost trends. In some cases, the cost estimates are made in base-year dollars and escalated to then-year dollars using the product-specific indices. In other cases, the estimate in then-year dollars may be built upon firm-fixed-price contracts. In any case, to establish a program baseline, the then-year dollars are returned to base-year dollars using the USD(C)/OMB inflation indices. Using this methodology, the final calculated program base-year dollar estimate will reflect any anticipated higher real price due to product-specific market influences beyond general inflation. This approach greatly improves the accuracy of projections of costs over long periods of time. Work in this area continued in 2014, and CAPE extended an earlier independent study to determine the best choice of a product-specific index for military aircraft.

Cost Data Systems

The Defense Cost and Resource Center (DCARC) is the CAPE field office responsible for administering the CSDR system. An increased management emphasis throughout the Department concerning the importance of cost data reporting has resulted in significant increases in the quantity of cost data reports compared to the acquisition reform era of the 1990s. Figure 1 shows the annual volume of CSDR data reports collected by the DCARC for each of the major system commodities

Figure 1. CSDR Data Collection Over Time



1990s reform efforts limited cost data collection and damaged DoD's ability to produce quality cost estimates

Figure 1. CSDR Data Collection over Time

The management emphasis on cost data reporting is not limited to the quantity of data reports collected. Based on feedback from government users about desired report enhancements, as well as advancements in information systems technology, CAPE and the Cost Leadership Forum have commissioned several government management teams and working groups to improve business processes and quality for data collection and reporting.

Today a large amount of costing data is collected in the many forms of CSDR report formats, which were first created in the 1960s. Contractors currently must make manual allocations from their financial and other accounting systems into these formats. CAPE, partnering with the military department cost agencies, has commissioned a government team to modernize the reporting data structures in order to ensure that the cost community has the breadth and depth of data to support good cost analysis. Moreover, CAPE is working with industry to achieve more efficient and better data transfers by enabling the automated submission of low-level cost data directly from contractors' accounting systems into the government systems. Instead of collecting data annually at best—and in some cases many years apart—the data collections will be available as needed and in some cases aligned with the monthly Earned Value submissions. CAPE is also working with USD(AT&L) to better align the CSDR and their Cost Performance Reports reporting structures. This means that contractors will no longer have to manually allocate one set of data into another structure, eliminating an inevitable source of data errors.

The emergence of modern Enterprise Resource Planning systems has enabled a transformation to accomplish this reform that will improve data quality, reporting compliance, and timeliness, and also reduce the reporting burden on contractors. A major focus for this reform will be to make sure the data collection process—quality checks and all—produces error-free results the first time, and to make sure that this authoritative data is easily available and accessible to all those in the government who need to use it. This project is colloquially known in the cost community as “moving to the X-Files,” a reference to the next generation of cost reports.

An additional working group is devoted to improved software data collection and reporting. This working group reviewed the current software data reporting and determined that there was insufficient standardization for the data reported pertaining to software development size, effort, complexity, productivity, and schedule. Moreover, the data that was reported often was not at the level of detail needed for cost analysis and estimates. The working group also is expanding the scope of the data reporting to include major software maintenance efforts. The working group is now developing revised data report formats and instructions for reporting contractors using state-of-the-art terms,

definitions, and metrics for software development and maintenance. The working group has also assessed that the data being reported are not subjected to complete and rigorous quality control, and has recommended a specific plan for the creation of an institutionalized verification and validation process. Beyond the improvement of individual data reports, the long-term goal for the working group is to assemble the data into a comprehensive and authoritative software database with user-friendly tools available for cost analysts.

Another working group is studying the addition of system technical (design and performance) data to the cost and software information already collected. Cost analysts often need technical data for legacy and new systems to make adjustments for complexity or develop cost estimating relationships used in estimates. However, the technical data working group determined that there is no standardized collection of technical data, and that the collection that does exist today is *ad hoc* with many different government organizations using their own unique terminology, definitions, and report formats. The technical data working group is now studying possible approaches to developing standardized reporting for each weapon system commodity type (i.e., aircraft, electronic system, missile, etc.) that complies with the DoD approved WBS format, maximizes the use of existing technical data, and can be efficiently integrated with the existing DCARC infrastructure for the CSDR system.

While the data collection process is being transformed, the DCARC remains committed to the users of the data currently being collected. The DCARC hosts semiannual CSDR Focus Group meetings that provide a forum for DoD and industry stakeholders to discuss evolving CSDR policies and processes, and raise any issues or concerns. The DCARC continues to provide on-site training to users and data providers at various locations several times each year. This training addresses CSDR policies, CSDR plan construction and subsequent reporting requirements, and DCARC information technology systems and applications.

Cost Assessment Data Enterprise

CAPE initiated the development of the CADE—the Department’s unified initiative to collect, organize, and use data more efficiently. CAPE is partnering with the military department cost agencies and the USD(AT&L) staff to incrementally work towards its CADE vision of the government cost analyst’s centralized database and virtual library, housing seamless integrated authoritative data sources that are easily searchable and retrievable. The objectives and a high-level framework of the CADE architecture are shown in Figure 2.

Cost Assessment Data Enterprise (CADE)

OSD CAPE

Objectives

Improve Analyst Productivity

(At all levels: OSD, Services, Program Offices)

- Increase output per unit time
- Provide near real-time access to data, more data, and less burden on the analyst to retrieve and process
- Reduce time for analyst to climb the program familiarization learning curve

Effectiveness

- Enable more comprehensive assessments
- Gain insight from previous analysts
- Facilitate telling the program's "story", holistic analysis

Data Quality & Reporting Compliance

- Includes all the Department's cost data - both EVM and CSDRs

Comprehensiveness

- Having all information at the analyst's fingertips – a centralized virtual library

Source Data Transparency

CADE: Modernizing the Cost Community and Integrating Across DoD

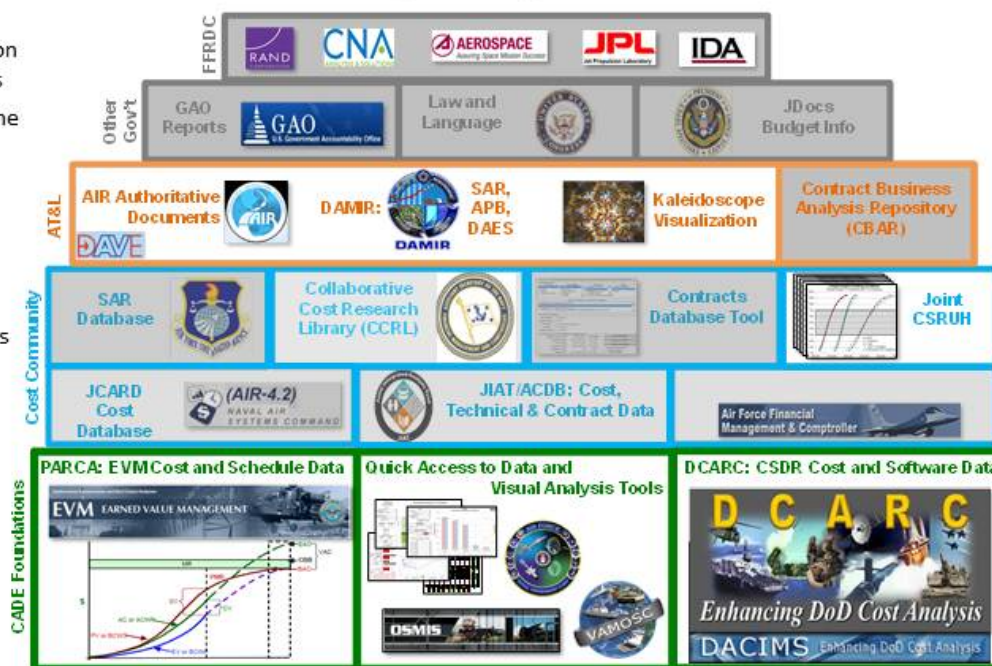


Figure 2. Cost Assessment Data Enterprise

CAPE, with its partners in the military department cost agencies and USD(AT&L), through CADE is taking on the integration of cost and technical data including EVM reports, next-generation CSDR reports (building upon the X-Files data reform described in the previous section), and O&S data. This involves a major effort of consolidating an authoritative collection of historical data and ensuring that all future data collected is exactly what the cost community needs to best perform. CAPE is working with USD(AT&L) to capitalize on the acquisition data already collected in the Defense Acquisition Visibility Environment (DAVE) and to integrate it with our cost data for a full government analyst view of a weapon program or portfolio.

CADE not only will store cost and acquisition data, it will also contain the Department's own institutional knowledge for each of the programs, improving communication throughout our cost community and across OSD. This will allow tomorrow's analysts to learn from the experiences of today's analysts, and it will provide today's analysts with a way to save their carefully produced analytics between milestones, so they can return years later and not have to start their analysis all over again with no prior information. It will provide a fuller history capturing prior work, enabling more holistic analyses to be developed.

The project will automate common views of data that help to begin telling a program's story, which previously took analysts months to create. The goal is to reduce time spent on *ad hoc* data collection and validation, allowing more time for actual analysis at a much deeper level, and quicker ability to see how a program is performing between major reviews. This initiative will increase productivity of analysts and will also provide a way for analysts to build upon each other's work, whereas, historically, analysts typically engaged in separate efforts.

CADE offers the opportunity for cost analysts to spend less time gathering data and more time analyzing it. This will allow the cost community to become a more efficient and productive workforce, which will become more critical in an era of human resource constraints.

Tracking to Approved Estimate—Program/Budget Review and Acquisition

The current acquisition process in the Department is event-driven and episodic in nature, and is driven primarily by the key milestone and other review events identified in statute and regulation. CAPE and the military department cost agencies are moving to a more continuous approach in following and tracking program performance, updating cost and schedule estimates, and evaluating new program risks and issues as they are identified.

As part of the Department's program and budget review process, CAPE—in conjunction

with USD(AT&L)—reviews each major acquisition program with significant funding changes from the latest baseline or prior year's President's Budget to determine the source of the cost estimate supporting the revised program and to ensure that the program remains fully funded. In addition, this year the services contributed 24 revised program office or military department cost agency estimates that were used to support the preparation of the FY 2016-2020 POM. This process of tracking to the approved estimate will be even more important in the future, as the Department continues to face significant funding constraints and instability, resulting in more frequent and haphazard reductions in program quantities and annual procurement rates, and more pressures to budget programs at less than full funding.

Cost Analysis Education and Training

CAPE is leading several initiatives to improve the education and training of the DoD civilian and military workforce in cost assessment, in accordance with the assigned responsibilities and goals of WSARA—namely, improved analytical skills and competencies for the cost community workforce.

Toward that end, CAPE and the military department cost agencies formed an Education and Training Working Group that periodically reports its status to the Cost Leadership Forum. The Working Group found that there was no centralized cost community education and training standard. As a first step to remedy this situation, the Working Group developed a framework of desired core competencies—for apprentice, mid-level, and senior cost analysts—that will be used to guide education and training standards in the future. In addition, CAPE now co-chairs the oversight group responsible for approval of the curriculum associated with DAU and other courses leading to professional certification in Acquisition Cost Estimating.

CAPE and the military departments are also working to establish more specialized technical training. CAPE is developing a training program to teach best practices for incorporating inflation and price escalation into cost assessments. The training will illustrate how approaches for normalizing price data can affect cost estimating relationships, learning forecasts, resource decisions, and budgeting. The training will target both new and experienced analysts.

CAPE and the military departments are working with the USD(AT&L) Director of Defense Pricing, the Defense Contract Management Agency, and the Defense Contract Audit Agency to increase the collaboration among cost analysts and contract price analysts, including the sharing of tools, methods, and data. As a recent example, the Cost and Systems Analysis office at the U.S. Army TACOM Life Cycle Management Command initiated a professional development effort in 2014 to bring Government cost

estimators and contract pricing analysts together to educate each other on respective missions, products and timelines and to identify opportunities for data sharing and collaboration between the two disciplines to enhance contract negotiations and data-driven decision support. In addition, the professional development efforts included bringing in a speaker from the automotive private sector to understand how the automotive sector develops cost estimates and how it uses models and estimates to support negotiations with suppliers.

A significant challenge for the education and training of the workforce is current restrictions on travel and conferences; the cost community is largely dependent on education and training funding provided by the Defense Acquisition Workforce Development Fund (section 852 of the *National Defense Authorization Act for Fiscal Year 2008*, Public Law 110-181).

CAPE has supported the Navy and the Naval Postgraduate School in establishing an accredited Master's Degree Program in Cost Estimating and Analysis (MCEA) that began in April 2011. This two-year, distance-learning program is a vital element of the education of the cost estimating community and improving cost estimates in both DoD and the defense industrial base. The program is part-time and consists of two courses per quarter, for eight quarters, with courses taken from operations research, systems engineering, and business and public policy. The program blends web-based, online instruction with video-televised education, and is tailored to students whose careers will not allow them to participate in a full-time, traditional, on-campus program. Tuition may be paid through the use of the Defense Acquisition Workforce Development Fund. The first cohort graduated in March 2013, and the second cohort graduated in March 2014. The third cohort commenced in Spring 2013 and is scheduled to graduate in March 2015; the fourth cohort commenced in Spring 2014 and is scheduled to graduate in March 2016; and the fifth cohort is now accepting applications for the degree program starting 30 March 2015.

The Air Force, which had been a partner in the MCEA program, has recently established its own Master's Degree Program in Cost Analysis (MCA) at the Air Force Institute of Technology (AFIT). This full-time graduate program is designed to advance the knowledge and creative problem-solving skills needed to effectively estimate program resources within the global military, DoD, and Air Force environments. The program curriculum integrates a strong foundation in quantitative concepts and techniques with specific military cost-related topics to prepare students to contribute effectively in a variety of complex and challenging roles in the global military arena. Besides the weapon system cost sequence, the curriculum includes courses in mathematical methods, quantitative decision making, economics, cost management, risk, finance, econometrics,

contract management, computer programming, and maintenance and production management. Program graduates are well grounded in course work related to follow-on assignments within the financial management field of cost estimating at the base, major command, and higher levels. Although the program has historically been focused on educating military members, it has recently begun to admit civilians.

Operating and Support Costs

For major weapon systems, O&S costs can often constitute the largest portion of the total life-cycle cost. Depending on the type of system, O&S costs can make up anywhere from 45 to 70 percent of total life-cycle cost. A careful examination of the O&S costs for the major systems in the Department is therefore appropriate and important. Optimistic forecasts of these costs can contribute to instability in the acquisition programs by resulting in a demand for more resources than originally expected, thereby undermining acquisition plans. Realistic funding of these accounts, and control of cost growth where possible, can help stabilize mid- and long-term plans for acquisition programs as well as the overall defense budget.

To help the Department deal with these issues, CAPE established a new O&S Cost Analysis Division in the summer of 2012. The division is responsible for a wide range of O&S cost estimates and analyses, and for assessing the adequacy of current systems, methods, and data used for preparing estimates of O&S costs. The division also partners with the USD(AT&L) staff to make O&S costs more visible in the acquisition decision process, with increased emphasis on O&S cost affordability and management.

The CAPE O&S cost division completed the *O&S Cost-Estimating Guide* in March 2014 and provided the document to the military departments and other OSD organizations. This guide explains and illustrates how O&S cost estimates and analyses can support key program decisions throughout the life cycle. The guide provides a tutorial on the best practices for preparing, presenting, and documenting O&S cost estimates. The guide also addresses legislative requirements for major weapon system O&S costs. The *National Defense Authorization Act for Fiscal Year 2012*, Public Law 112-81, established a provision concerning “Assessment, Management and Control of O&S Costs” that mandates several ambitious requirements intended for DoD to take specific steps to improve its processes concerning cost estimating and management of major system O&S costs. In particular, the provision requires the Department to periodically update estimates of program O&S costs, and track and assess these estimates relative to prior estimates. The guide describes how the Department has implemented this legislative provision in various DoD instructions and regulations, and provides recommended approaches and analytic methods for dealing with these new requirements. The guide is

now available on the CAPE web site at
http://www.cape.osd.mil/files/OS_Guide_v9_March_2014.pdf.

CAPE is responsible for executive oversight of the military department VAMOSC programs. In this capacity, the CAPE O&S cost division—in coordination with the military departments, USD(AT&L), the Under Secretary of Defense for Personnel and Readiness (USD(P&R)), and the Joint Staff—is leading a task force to recommend specific improvements to the Naval VAMOSC system. The team is developing a plan to correct known deficiencies in ship and ground system data, incorporate long-term integration of Navy Enterprise Resource Planning information, and provide additional user training requirements. The plan will be completed by June 2015 and its recommendations will be incorporated into the Navy FY 2017-2021 POM submission.

The CAPE O&S cost division is working with the DCARC to improve the current collection and reporting of contractor actual costs for major sustainment, logistics and maintenance contracts. The division and the DCARC are working with other stakeholders to recommend changes to the current reporting that will improve data quality and streamline data reporting. This team is working with the software data reporting working group mentioned earlier to establish weapon system software sustainment data collection and reporting. The team is monitoring the sustainment cost reporting for the F-35 aircraft, and is working to establish sustainment cost reporting for the F117 engine, a commercial-derivative engine that powers the C-17 airlift aircraft. The division is also working to establish cost reporting standards and processes for government depots.

Summary

CAPE is continuing to develop and refine plans for the Department's cost estimating and cost analysis functions. Implementation of these plans will ensure that the cost assessment organizations, workforce, policies and procedures, data collection systems, and training and education programs will be strengthened and improved as necessary to meet the expanded roles and responsibilities established by WSARA.

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Appendix A.

Cost Analysis Organizations in DoD

Independent Cost Assessment Organizations

There are four key offices for the preparation of ICEs. Within OSD, the office responsible for ICEs reports to the Director, CAPE. Within the military departments, these offices all report to their Assistant Secretary for Financial Management and Comptroller. The following paragraphs give a brief description and overview of these key offices responsible for ICEs.

OSD – Deputy Director for Cost Assessment

The CAPE Deputy Director for Cost Assessment prepares ICEs for all MDAPs and MAIS programs when acquisition oversight has not been delegated to a military department or Defense Agency, and reviews all cost estimates and cost analyses prepared by the military departments and Defense Agencies in connection with other MDAPs and MAIS programs. The Deputy Director for Cost Assessment provides leadership to the entire DoD cost community with regard to workforce development and management, policy and procedures, cost data collection, cost analysis education and training, and cost research.

Army – Deputy Assistant Secretary of the Army for Cost and Economics

The Deputy Assistant Secretary of the Army for Cost and Economics (DASA-CE) develops ICEs and Component cost analyses for Army weapon and information systems. DASA-CE conducts independent reviews and validation of business case analyses, economic analyses, and special cost studies of major weapon and information systems, force structure, and O&S costs. DASA-CE serves as the Cost and Economics advisor for Army Study Advisory Groups. It chairs and oversees the Army Cost Review Board, develops and approves the Army Cost Position for all major acquisition programs, and conducts in-depth risk analyses of major Army programs and associated costs.

Navy – Naval Center for Cost Analysis

NCCA advises the Secretary of the Navy, Chief of Naval Operations, and Commandant of the Marine Corps on cost and economic issues. NCCA leads the Department of the Navy cost community in issues of cost policy and policy implementation, with the goal of increasing the capability and efficiency of the Naval cost community. NCCA prepares independent cost analyses for Department of the Navy MDAPs and MAIS programs, and also conducts economic analyses and special studies to support relevant defense issues. NCCA coordinates all Department of the Navy cost research. The Executive Director of NCCA is the Deputy Assistant Secretary of the Navy (Cost and Economics).

Air Force – Deputy Assistant Secretary of the Air Force for Cost and Economics / Air Force Cost Analysis Agency

The Air Force develops life-cycle cost ICEs and non-advocate Component cost analyses of Air Force aircraft, space, weapons, command and control, and automated information systems to support acquisition, programming, and budgeting decisions. The Air Force also conducts non-advocate business case analyses, economic analyses, and special cost studies of major systems, force structure, and O&S costs supporting multiple Air Force and DoD stakeholders. It maintains the Air Force Total Ownership Cost (AFTOC) database mandated by the Congress, and develops annual aircraft cost per flying hour estimates to support planning, programming, and budgeting decisions. The Deputy Assistant Secretary of the Air Force for Cost and Economics develops the Air Force Cost Position for all major acquisition programs; conducts and coordinates cost research to develop analytical databases, methods, and tools; and advocates for and manages the Air Force cost analysis workforce ranging from tactical to headquarters levels.

Additional Field-Level Cost Organizations and Activities

There are several field-level cost organizations. These typically are located at a major product center such as NAVAIR or the Air Force Life Cycle Management Center (AFLCMC). This section provides a summary of these important organizations.

Army

TACOM Life Cycle Management Command (LCMC)

The TACOM LCMC Cost and Systems Analysis organization is responsible for preparation of program office estimates, life cycle cost estimates, economic analyses, and combat effectiveness modeling that support the development of combat and tactical vehicles. It manages the tools and databases to support cost and systems analysis processes for the TACOM LCMC. The major cost analysis activities are life cycle cost estimating, cost reporting and EVM, O&S cost baselines, support to AoAs, source selection evaluations, and cost analyses associated with multi-year procurement contracts.

Aviation and Missile Command (AMCOM)

The AMCOM Cost Analysis Division provides cost estimation and analysis support to Aviation, Missiles and Space Program Executive Offices and their Program/Project Offices. It manages the AMCOM Cost Analysis Program and develops, updates, or obtains cost estimating relationships, cost factors, and mathematical and computerized cost models for estimating purposes. It develops cost estimates to support AoAs, tradeoff studies, and force structure cost estimates. It develops and prepares life cycle cost estimates, and it conducts other related studies in support of weapon system cost analyses. It performs cost risk analyses and cost risk assessments to support weapon

system program decisions. It also provides validation/review for cost estimates, economic analyses, and business case analyses.

Communication-Electronics Command (CECOM)

The CECOM Cost Analysis Division provides cost estimation and analysis support to CECOM Program Executive Offices and their Program/Project Offices. It provides several cost analysis services, including life cycle cost estimating, EVM, economic analysis, modeling and simulation, computer software and database support, and review and validation of business case analyses and other cost analyses.

Navy

Naval Air Systems Command (NAVAIR)

The Cost Department of NAVAIR provides a wide variety of cost analysis products and services. Its primary focus is to provide a clear and comprehensive understanding of life cycle cost and attendant uncertainties to be used in developing, acquiring, and supporting affordable naval aviation systems. Besides life cycle cost estimates, the Cost Department provides source selection cost evaluation support, EVM analysis, cost research and databases, and various cost/benefit studies.

Naval Sea Systems Command (NAVSEA)

The Cost Engineering and Industrial Analysis Division of NAVSEA provides cost engineering and industrial base analysis for ships, ship-related combat systems, and weapons. It provides cost estimates in support of the DAB review process, including AoA studies. It also participates in contract proposal evaluations and the source selection process for builders and suppliers of ships and weapon systems, and it conducts analysis and forecasting of labor, industrial, and technical trends as they affect the overall acquisition of ships, combat systems, weapons, and other equipment.

Space and Naval Warfare Systems Command (SPAWAR)

The Cost Estimating and Analysis Division (SPAWAR 01-6) may—depending on a program’s acquisition category—provide assistance to ACAT I program offices, perform an ICE for ACAT II programs prior to a Milestone B or C review, or independently review a program office cost estimate upon the request of the Program Executive Officer (C4I and Space). SPAWAR 01-6 also provides more general cost analysis support to the Program Executive Officer (PEO) as needed.

Naval Surface Warfare Center

The Cost and Affordability Group resides within the Warfare Analysis Branch of the Requirements Analysis and Advanced Concepts Division of the Warfare Systems Department at the Naval Surface Warfare Center, Dahlgren Division. The Group produces cost estimates, cost-risk assessments, and affordability analyses for Combat

Systems. The Group also develops cost-estimating methodology in support of systems development and production, AoAs, and strategic planning. Particular areas of expertise include model development and maintenance, cost-research databases, technology assessments, life cycle cost estimates, budget and force-level analyses, performance-based cost models, product-oriented cost models, proposal evaluation, and source selection reviews.

Marine Corps Systems Command (MCSC)

The Cost and Analysis Branch (C&AB) is the MCSC authority in the field of cost analysis. The C&AB conducts and oversees the development of cost estimates for MCSC weapon, information technology, and non-standard training systems programs. The C&AB advises the Commander, MCSC and PEOs on the historic, current, and emerging trends in all elements of cost estimating and cost analysis. The Branch works for the MCSC Commander as an independent agent that provides cost products to Program Management Offices (PMOs) and PEOs. The Branch is organized into analytical teams in direct cost support of the PMOs and PEOs and a general support studies team for conducting AoAs and other operations research studies and analyses. Through its processes, the C&AB delivers life-cycle cost estimates to satisfy the “Will-Cost” estimate, whereas PMOs perform the “Should-Cost” analysis.

Air Force

Air Force Life Cycle Management Center (AFLCMC)

In 2012, the Air Force combined cost estimating activities from three product centers under AFLCMC: Aeronautical Systems Center, Electronic Systems Center, and Air Armament Center. AFLCMC leads estimates for program milestone decisions, manages the annual cost estimate process, supports pre-award activities and source selections, and participates in policy discussions resulting in high-quality cost estimates and analysis across the Center.

Air Force Space Command, Space and Missile Center (SMC)

The SMC Cost Estimating Division supports cost estimates and cost analyses associated with Air Force Space Command and the SMC’s mission of satellite acquisition, launch, and control.

Air Force Sustainment Center (AFSC)

The AFSC Cost Estimating Division supports cost estimates and cost analyses associated with the AFSC’s mission to provide depot maintenance, supply chain management and installation support to Air Force weapon systems.

Air Force Nuclear Weapons Center (AFNWC)

The AFNWC Cost Estimating Division supports cost estimates and cost analysis for all nuclear weapon systems activities. The responsibilities of the AFNWC include acquisition, modernization, and sustainment of nuclear system programs for both DoD and the Department of Energy.

Other

National Reconnaissance Office (NRO) Cost Analysis Improvement Group

The NRO Cost Analysis Improvement Group provides independent cost estimating support to the NRO. This support covers milestone decisions, budget submissions, EVM, *ad hoc* program support, data collection, methods development, and model/tool development.

Defense Information Systems Agency (DISA)

The DISA Analysis and Internal Controls Division guides, directs, and strengthens cost analyses within DISA; and prepares cost estimates for the development, procurement, and sustainment of automated information systems and information technology capabilities. The Division provides independent support for DISA program/project costing efforts, and publishes DISA policies, practices and templates for cost estimation, cost/benefit analysis, and economic analysis.

Missile Defense Agency (MDA)

The MDA Director of Cost Estimating and Analysis (DOC) is responsible for ensuring the quality of cost estimates, providing direction on cost estimating processes, and working with the service cost organizations, CAPE, and the Government Accountability Office on all cost-related matters. In recent years MDA/DOC has worked closely with CAPE on preparing cost estimates for MDA programs and responding to Congressional and Missile Defense Executive Board inquiries and tasks.

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Appendix B.

Major Defense Acquisition Program Unit Cost Reporting

Since 1982, the Congress has required DoD to track and report on the unit cost for most MDAPs. The requirement for unit cost reporting may be waived if the program has not entered Engineering and Manufacturing Development (EMD), a reasonable cost estimate has not been established for the program, and the system configuration is not well defined. The provisions of the law concerning unit cost reporting, commonly referred to as the Nunn-McCurdy provisions, are found in section 2433 of title 10, United States Code. A complete description of the Department's implementation of these provisions is provided in the *Defense Acquisition Guidebook*: see section 10.9 ("Acquisition Program Baseline") and section 10.10.1.5 ("Unit Cost Reports").

There are two unit cost metrics subject to reporting, Program Acquisition Unit Cost (PAUC) and Average Procurement Unit Cost (APUC). PAUC is defined as the total program acquisition cost (sum of research, development, test, and evaluation; procurement; military construction; and acquisition-related Operations and Maintenance (O&M) appropriations) divided by the total program quantity of fully configured end items from both the EMD and Production and Deployment Phases. APUC is defined as the program procurement cost divided by the procurement quantity. Both unit cost metrics are tracked in constant dollars of a base year established for each program.

The most current cost estimate for each unit cost metric is tracked relative to two baseline cost estimates. The current baseline estimate refers to the most recent baseline approved by the MDA. The original baseline estimate refers to the baseline approved at program initiation (usually Milestone B). A program is declared to have a unit cost breach when the current unit cost estimate exceeds either baseline unit cost estimate by more than certain specified percentages. Specifically, as shown in Table B-1, a unit cost breach takes place when any of the following criteria are met, for either version of program unit cost (APUC or PAUC):

Table B-1. Unit Cost Breach Thresholds

	"Significant" Breach	"Critical" Breach
Current Baseline Estimate	+15%	+25%
Original Baseline Estimate	+30%	+50%

Note that there are two degrees associated with the severity of the unit cost breach. For *significant* unit cost breaches, the Department notifies the Congress of the breach within 45 days of the unit cost report and subsequently submits a program SAR with additional, breach-related information. For *critical* unit cost breaches, in addition to notifying the Congress and submitting the SAR, the Department is required to conduct a complete

assessment of the program, led by USD(AT&L), and determine if it should be terminated or continued. The Department is required to terminate the program unless a letter signed by USD(AT&L), providing the certification that the program currently meets certain criteria established in law (section 2433a of title 10, United States Code), is submitted to the Congress within 60 days of the SAR submission. Among other things, USD(AT&L) must certify that the Director, CAPE has determined the new unit cost estimates are reasonable. A complete description of the critical unit cost breach certification process can be found in the *Defense Acquisition Guidebook*, section 10.10.1.5.2.2 (“Critical Cost Breach Certification Requirements”).

Appendix C.

Major Automated Information System Reporting

Public law (section 2445c of title 10, United States Code) requires annual and quarterly reports from MAIS programs, pre-MAIS (now referred to as unbaselined MAIS) programs, and any other investment in automated information system products or services that is expected to exceed the MAIS thresholds. Details about the MAIS reporting requirements may be found in the *Defense Acquisition Guidebook*, section 10.11 (“Major Automated Information System Statutory Reporting”). Briefly, a MAIS Quarterly Report is used internally within the Department, and a MAIS Annual Report is provided to the congressional defense committees 45 days after submission of the President’s Budget. The formats of the quarterly report and annual report are similar. The reports provide a program description, a summary of the program status, and the latest estimates regarding schedule, performance characteristics, acquisition cost, and life-cycle cost.

The reports compare the latest estimates of schedule, performance, and costs relative to the program baseline approved at the previous acquisition milestone. This comparison is used to determine if the program has a deviation known as either a significant change or a critical change. A significant change occurs when a program has a schedule delay of more than six months, but less than one year; there is a significant, adverse change in the expected performance of the system; or the estimated acquisition cost or life-cycle cost has increased by at least 15 percent but less than 25 percent. For a program with a significant change, the Department is required to notify the congressional defense committees of the change within 45 days after receiving the report that identified the deviation.

A critical change occurs when a program has a schedule delay of one year or more or fails to achieve a full deployment decision within five years of when funds for the program were first obligated;³ there is a change in expected performance that will undermine the ability of the system to perform its intended functions; or the estimated acquisition cost or life-cycle cost has increased by 25 percent or more. For a program with a critical change, the Department must conduct an evaluation of the program, and then submit a report and a formal certification to the congressional defense committees within 60 days after receiving the report that identified the deviation; otherwise, appropriated funds may not be obligated for any major contract under the program until the certification is submitted. The certification must affirm the following:

³ A recent legislative change (section 802 of the *National Defense Authorization Act for Fiscal Year 2015*, Public Law 113-291) was made so that beginning this year a failure to achieve a full deployment decision within five years results in a MAIS significant change, and not a critical change. This legislative change will be reflected in the activities reported in next year’s Annual Report.

- (1) the program is essential to the national security or to the efficient management of DoD;
- (2) there is no alternative to the system or information technology investment which will provide equal or greater capability at less cost;
- (3) the new estimates of the costs, schedule, and performance parameters with respect to the program have been determined, with the concurrence of the Director, CAPE, to be reasonable; and
- (4) the management structure for the program is adequate to manage and control program costs.

Appendix D.

DoD Cost Data Collection Systems

Three primary data collection systems are used by DoD as the major sources of cost data for major acquisition programs:

- CSDR system – serves as the primary source of actual cost information reported for major contracts and subcontracts associated with MDAPs and MAIS programs
- EVM Central Repository – used to collect and archive EVM reporting documents
- VAMOSC systems – collect historical O&S costs for major weapon systems

Both the CSDR and EVM reporting use a common, product-oriented taxonomy known as a WBS that follows the guidelines of the DoD Standard Practice, *Work Breakdown Structures for Defense Materiel Items* (MIL-STD-881C). The WBS is a hierarchy of product-oriented elements (hardware, deliverable software, data, and services) that collectively constitute the system to be developed or produced. Further information about the use of the WBS in cost reporting and cost estimating can be found in the *Defense Acquisition Guidebook*, section 3.7.1.1 (“Work Breakdown Structure”).

Cost and Software Data Reporting System

System Description

The CSDR system is the primary means that DoD uses to collect actual cost and related data on major defense contracts and subcontracts. Defense contractors support the CSDR system, under contractual agreements, by reporting data on development, production, and sustainment costs incurred in executing contracts. The two principal components of the CSDR are contractor cost data reporting (CCDR) and software resources data reporting (SRDR) systems. These systems are hosted on a secure web-based information repository known as the Defense Automated Cost Information Management System.

CCDR is the primary means within DoD to systematically collect data on the development, production, and sustainment costs incurred by contractors. DoD Instruction 5000.02, *Operation of the Defense Acquisition System*, establishes the CCDR requirements for major contracts and subcontracts (regardless of contract type) associated with MDAPs and MAIS programs.

The SRDR system collects software cost metrics data to supplement the CCDR cost data, to provide a better understanding and improved estimating of software-intensive programs. DoD Instruction 5000.02 establishes SRDR requirements for major contracts

and subcontracts (regardless of contract type) associated with MDAPs and MAIS programs. Data collected from applicable contracts include type and size of the software application(s), schedule, and labor resources needed for the software development.

The CSDR data that is collected today is illustrated in Figure D-1. Access to CSDR data is provided by the DCARC to authorized and approved users. There are currently over 1,800 approved users. Detailed procedures and other implementation guidance for both CSDR systems are found in DoD 5000.04-M-1, *Cost and Software Data Reporting (CSDR) Manual*. This manual (as well as downloadable report formats and definitions, specific report examples, and other related information) can be found on the DCARC website at <http://dcarc.cape.osd.mil>.

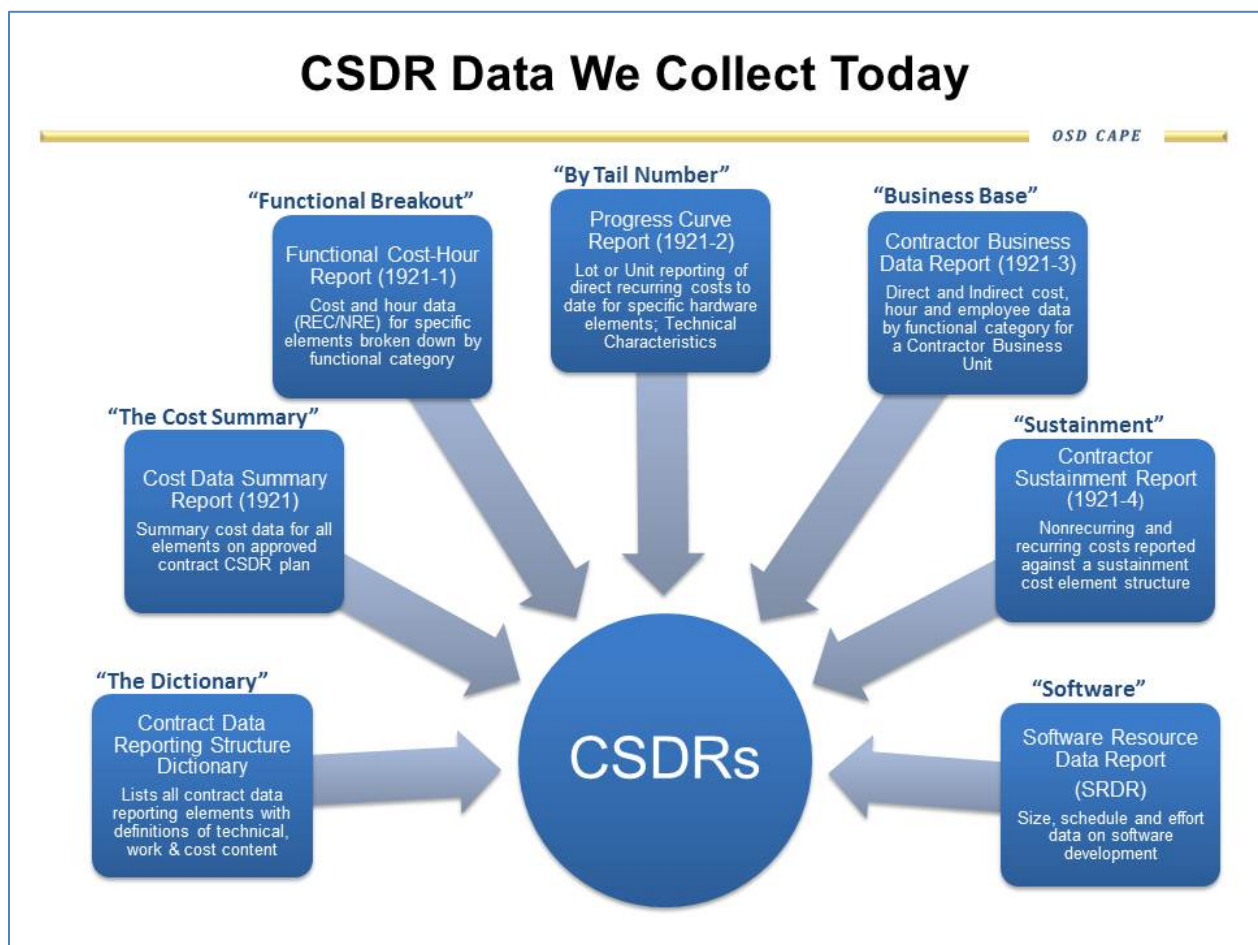


Figure D-1. CSDR Data Reports

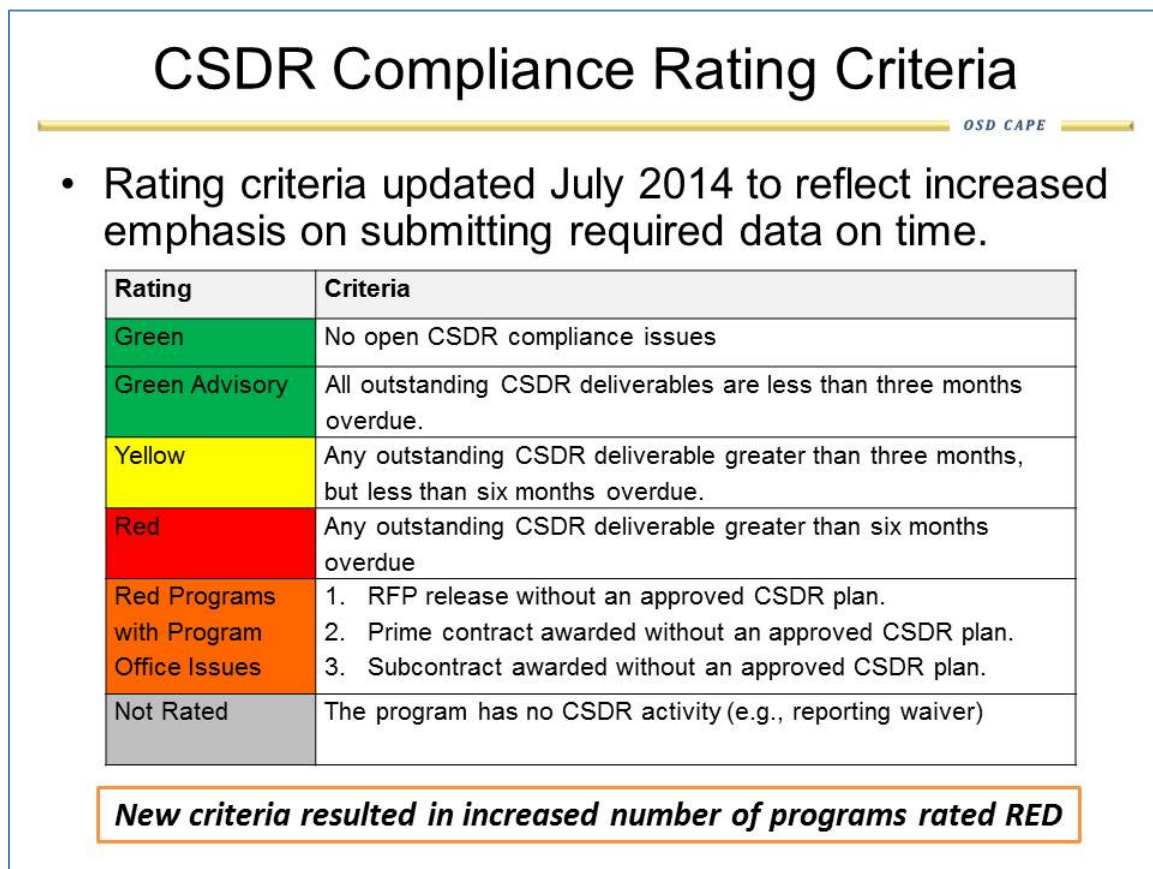
The CSDRs provide essential cost information based on actual cost experience not found in other data sources. The reports provide labor hours, material dollars, and overhead dollars by WBS element and cost estimating functional category. The data may also be used to investigate fixed-variable direct and indirect cost behavior, and to segregate

nonrecurring and recurring costs. The data from these reports can be used to construct learning curve projections for labor hours and other recurring costs at various levels of the WBS.

Cost and Software Data Reporting Compliance

The DCARC continually monitors each MDAP for compliance with CSDR requirements where applicable. CSDR reporting is not required when (1) the program is in pre-Milestone A status, with no prototypes, or (2) the CSDR requirements have been waived by CAPE. Waivers for CSDR requirements may be granted when (1) a program is a procurement of a commercial system, or (2) a program is purchased under competitively awarded, firm fixed-price contracts, as long as competitive conditions continue to exist.

The CSDR compliance rating criteria for programs, which were recently revised, are provided in Figure D-2 below.



Note: RFP – Request for Proposal.

Figure D-2. CSDR Compliance Rating Criteria

The program compliance for all MDAPs using the revised criteria for the last two quarters of 2014 is provided in Table D-1.

Table D-1. MDAP CSDR Compliance (number of programs)

	Q3 2014	Q4 2014
Green/Green Advisory	139	135
Yellow	39	21
Red	0	21
Not Rated	48	37

The CSDR compliance data shown in previous editions of the Annual Report were based on the earlier criteria, and are not directly comparable to the more recent data shown above.

Earned Value Management Central Repository

In support of the USD(AT&L) staff, the DCARC hosts the EVM Central Repository. The central repository supports the centralized reporting, collection, archiving, and distribution of key EVM data reports (such as Integrated Program Management Reports) for MDAPs and MAIS programs. Information about the central repository is available on the DCARC website at [http://dcarc.cape.osd.mil/EVM /EVMOverview.aspx](http://dcarc.cape.osd.mil/EVM/EVMOverview.aspx). More general information about EVM reporting is available in the *Defense Acquisition Guidebook*, section 11.3.1 (“Earned Value Management”), and on the DoD EVM website at <http://www.acq.osd.mil/evm>.

The central repository supports complete, timely, and secure transfer of electronic data from the contractor to the repository; secure and controlled warehousing of the data; and controlled, timely, and secure access to the data by authorized users. The main purpose of these data is to provide a consistent and timely situational awareness of acquisition execution.

Visibility and Management of Operating and Support Costs Data System

DoD requires that each military department maintain a system that collects historical data on the O&S costs for major fielded weapon systems. The CAPE Deputy Director for Cost Assessment provides policy guidance on this requirement, known as the VAMOSC program; specifies the common format in which the data are to be reported; and monitors its implementation by each of the military departments. The *National Defense Authorization Act for Fiscal Year 2012*, Public Law 112-81, contains a provision that calls for strengthened CAPE oversight of the VAMOSC program.

Each department has its own unique VAMOSC data system that tracks actual O&S cost experience for major weapon systems. The data can be displayed by timeframe, at various levels of detail, and by functional elements of cost (such as depot maintenance, fuel, consumable items, and so forth). Each VAMOSC system provides not only cost data, but related non-cost data (such as system quantities and operating tempo) as well.

VAMOSC data can be used to analyze trends in O&S cost experience for each major system, as well as to identify and assess major cost drivers. VAMOSC data systems are managed by each military department as follows:

- The Navy's VAMOSC management information systems (known as Navy VAMOSC and Marine Corps VAMOSC) collect and report US Navy and US Marine Corps historical weapon system O&S costs. VAMOSC provides the direct O&S costs of weapon systems; some indirect costs (e.g., ship depot overhead); and related non-cost information such as flying hour metrics, steaming hours, age of aircraft, and personnel counts for ships. It is managed by NCCA. See page 37 for details on the Department's efforts to correct known deficiencies in this system and the business processes that support it.
- The Army's VAMOSC system, called the Operating and Support Management Information System (OSMIS), tracks operating and support information for over 1,400 major Army weapon/materiel systems and is maintained by DASA-CE. OSMIS-tracked systems include combat vehicles, tactical vehicles, artillery systems, aircraft, electronic systems, and miscellaneous engineering systems. OSMIS provides cost data for these systems, as well as non-cost information such as aircraft flying hours or vehicle miles, fuel consumption, demand for parts, and number of end-item overhauls.
- The Air Force's VAMOSC system, AFTOC, is managed by the Deputy Assistant Secretary of the Air Force for Cost and Economics. It provides O&S cost information on all Air Force aircraft, space systems, and missiles. The O&S cost information collected includes unit-level manpower, fuel, depot maintenance overhaul costs, depot-level reparable costs, and other costs of major US Air Force aircraft and engines. AFTOC also provides data on aircraft quantities and flying hours, numbers of personnel, and other non-cost information

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Abbreviations

ACAT	Acquisition Category
AFIT	Air Force Institute of Technology
AFLCMC	Air Force Life Cycle Management Center
AFNWC	Air Force Nuclear Weapons Center
AFSC	Air Force Sustainment Center
AFTOC	Air Force Total Ownership Cost
AMCOM	Aviation and Missile Command
AoA	Analysis of Alternatives
APUC	Average Procurement Unit Cost
C&AB	Cost and Analysis Branch
CADE	Cost Assessment Data Enterprise
CANES	Consolidated Afloat Network Enterprise Services
CAPE	Cost Assessment and Program Evaluation
CARD	Cost Analysis Requirements Description
CCDR	Contractor Cost Data Reporting
CEC	Cooperative Engagement Capability
CECOM	Communication-Electronics Command
CEPE	Cost Estimating and Program Evaluation
CRH	Combat Rescue Helicopter
CSDR	Cost and Software Data Reporting
DAB	Defense Acquisition Board
DASA-CE	Deputy Assistant Secretary of the Army for Cost and Economics
DAU	Defense Acquisition University
DAVE	Defense Acquisition Visibility Environment
DCARC	Defense Cost and Resource Center
DISA	Defense Information Systems Agency
DOC	Director of Cost Estimating and Analysis
DoD	Department of Defense
DoDCAS	Department of Defense Cost Analysis Symposium
EMD	Engineering and Manufacturing Development
EPS	Enhanced Polar System
EVM	Earned Value Management
FCoM	Full Cost of Manpower

FMS	Foreign Military Sales
FY	Fiscal Year
FYDP	Future Years Defense Program
ICE	Independent Cost Estimate
IFPC Inc2-I	Indirect Fire Protection Capability Increment 2 - Intercept
G/ATOR	Ground/Air Task Oriented Radar
JPALS	Joint Precision Approach and Landing System
LCMC	Life Cycle Management Command
MAIS	Major Automated Information System
MCA	Master's Degree Program in Cost Analysis
MCEA	Master's Degree Program in Cost Estimating and Analysis
MCSC	Marine Corps Systems Command
MDA	Milestone Decision Authority
MDA	Missile Defense Agency
MDAP	Major Defense Acquisition Program
MSE	Missile Segment Enhancement
MYP	Multi-Year Procurement
NAVAIR	Naval Air Systems Command
NAVSEA	Naval Sea Systems Command
NCCA	Naval Center for Cost Analysis
NNSA	National Nuclear Security Administration
NRO	National Reconnaissance Office
O&M	Operations and Maintenance
O&S	Operating and Support
OMB	Office of Management and Budget
OSD	Office of the Secretary of Defense
OSMIS	Operating and Support Management Information System
PAC	Patriot Advanced Capability
PAUC	Program Acquisition Unit Cost
PEO	Program Executive Officer
PIM	Paladin Integrated Management
PMO	Program Management Office
POM	Program Objective Memorandum
RFP	Request for Proposal

SAR	Selected Acquisition Report
SM-3	Standard Missile-3
SMC	Space and Missile Center
SPAWAR	Space and Naval Warfare Systems Command
SRDR	Software Resources Data Reporting
THAAD	Terminal High Altitude Area Defense
3DELRR	Three-Dimensional Expeditionary Long-Range Radar
USD(AT&L)	Under Secretary of Defense (Acquisition, Technology and Logistics)
USD(C)	Under Secretary of Defense (Comptroller)
USD(P&R)	Under Secretary of Defense (Personnel and Readiness)
VAMOSC	Visibility and Management of Operating and Support Costs
VTUAV	Vertical Takeoff and Landing Unmanned Aerial Vehicle
WBS	Work Breakdown Structure
WSARA	Weapon Systems Acquisition Reform Act of 2009

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